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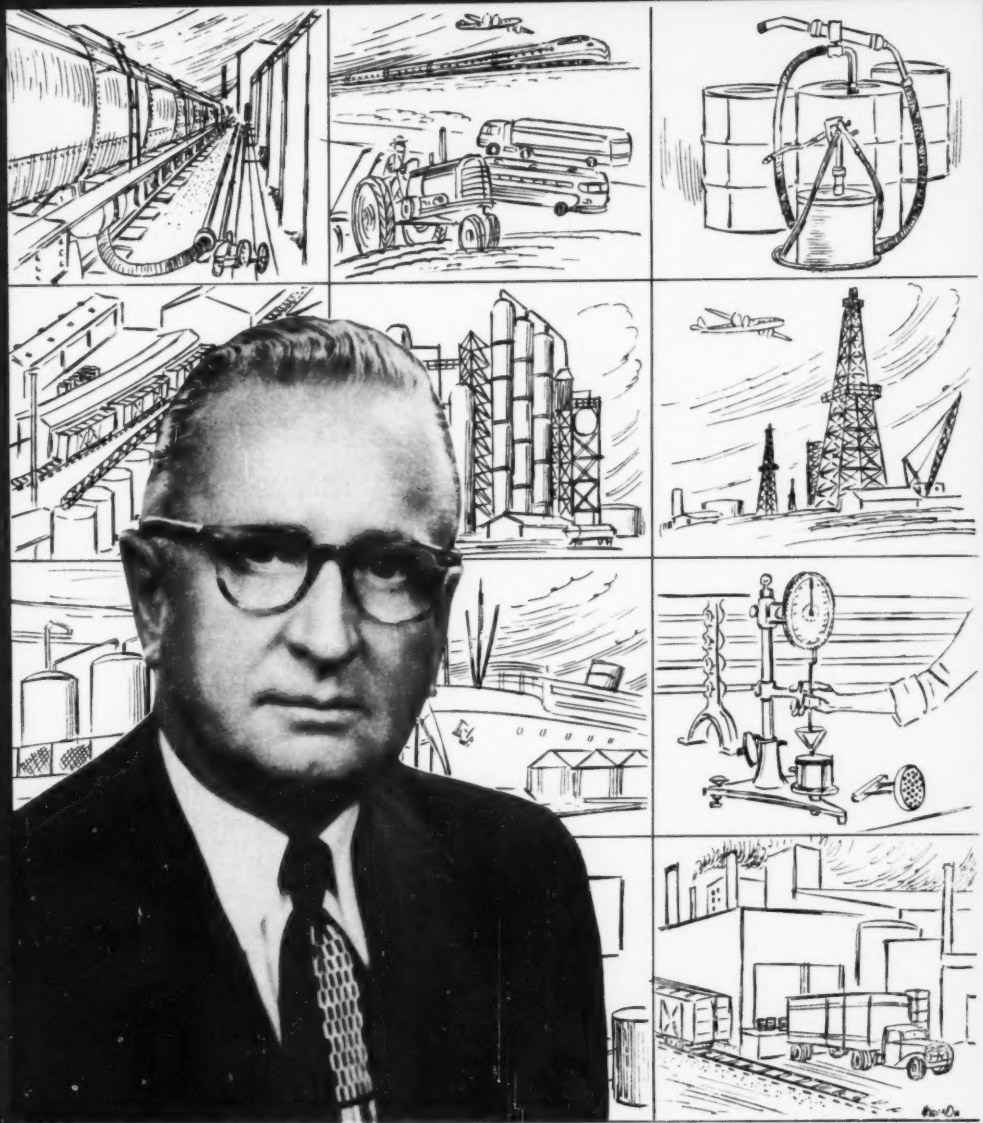

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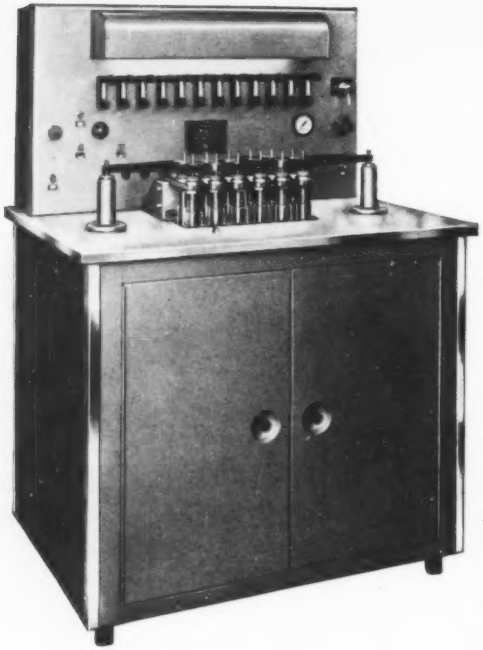

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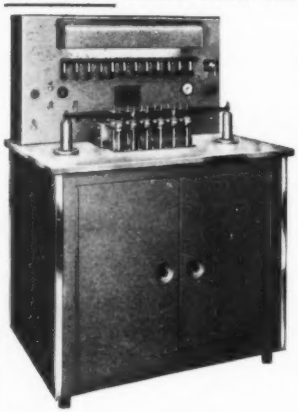

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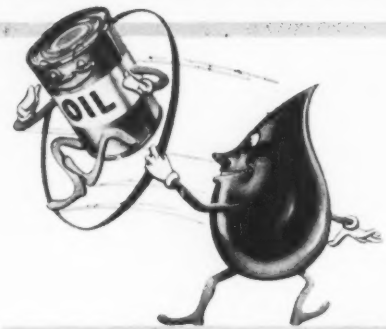

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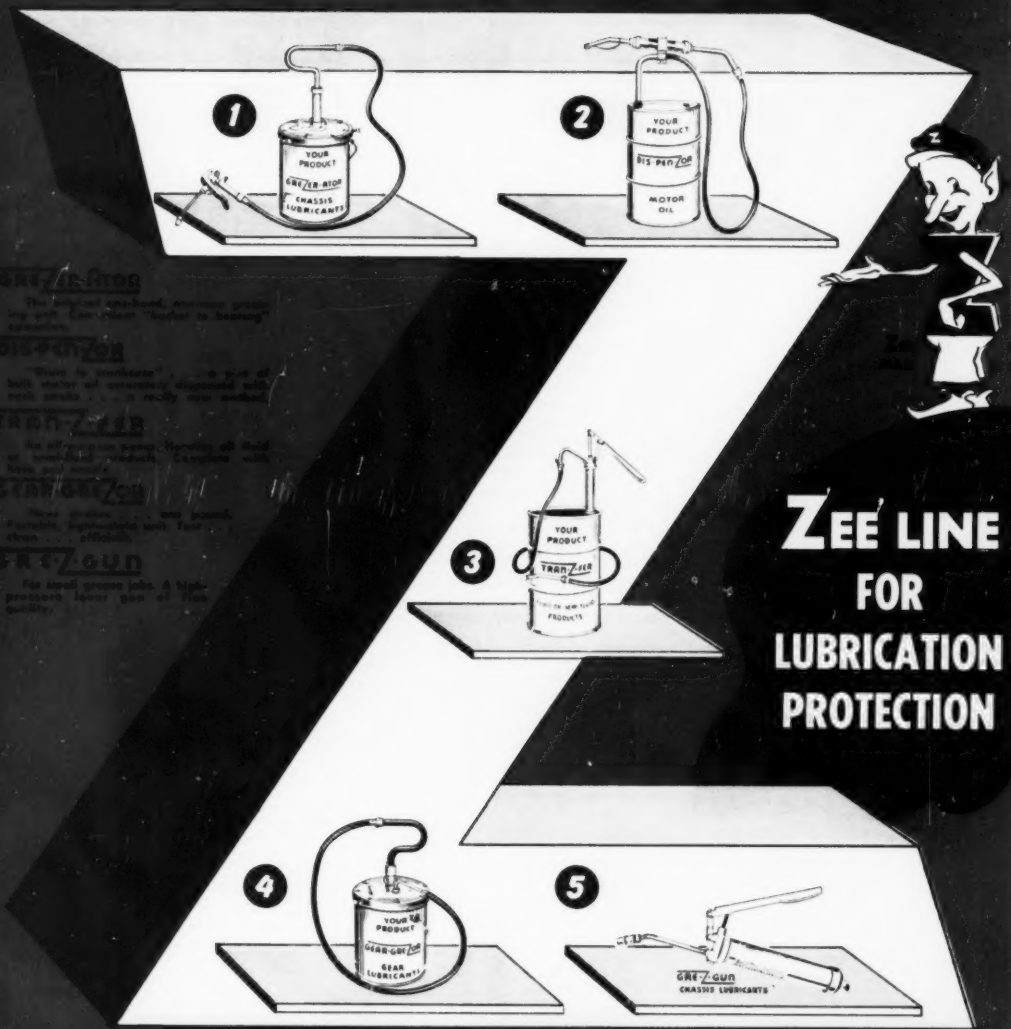

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Arthur J. Daniel New President of N.L.G.I.

Mr. Arthur J. Daniel has been elected President of the National Lubricating Grease Institute. His election was announced October 4th at the annual meeting of the N.L.G.I. in New Orleans, Louisiana. Mr. Daniel, President of the Battenfeld Grease and Oil Corporation, succeeds Mr. B. G. Symon, the retiring president.

Mr. Daniel, a member of the organization's Board of Directors, was elected Vice President of the N.L.G.I. at last year's annual meeting. He has been active in the organization since 1933 when he helped to form the constitution and by-laws of the Institute.

Widely known throughout the Petroleum Industry, Mr. Daniel began his career in 1916. In 1919 the Battenfeld Grease and Oil Corporation was organized and Mr. Daniel was elected Vice President and Secretary. He held this position until his election of President of the Corporation in 1947.

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President's page

by B. G. Symon, President, N.L.G.I.

This month I want to cite a few of the varied honors recently accorded the N.L.G.I. that help to indicate the steady progress being made by our organization.

First, as many of you know, "The Institute Spokesman" has received the 1949 General Improvement Award for magazines given by the Society of Associated Industrial Editors.

In the 12 years since it was founded, the "Spokesman" has established a fine reputation among magazines of its type, both for its appearance and content. From humble beginnings, it has achieved national recognition. In fact, it is now distributed throughout the world and is recognized as the final authority on the manufacture and application of lubricating greases.

The "Spokesman" was edited by George W. Miller from 1937, when it was founded, until 1946. Mr. Miller gave freely of his time to serve both as secretary of the Institute and editor of the magazine. The editorship passed to Carl E. Bolte, our first full-time secretary, in 1946, and he expanded the "Spokesman" into a full-fledged magazine. During the past year, it has continued to grow in size and importance under the editorship of Harry F. Bennetts.

The award the magazine recently received was given by the leading industrial editors of the United States and Canada. It is a tribute not only to the healthy growth of the "Spokesman" but also to the growth of our entire organization.

This past summer another unusual honor was accorded the N.L.G.I. when our executive secretary was invited to lecture at Northwestern University on trade associations. The fact that he was selected for this assignment by the Northwestern faculty and fellow trade association executives points once again to the high standing of our organization in the trade association field.

For another illustration of the national recognition achieved by the N.L.G.I., we might point out that on several occasions during the past year, our office has been requested to furnish a copy of the N.L.G.I. Constitution and By-Laws to other trade associations as a model for their own. H. P. Hobart, C. B. Karns and Paul V. Keyser, Jr., are the men who drafted this excellent document. Their work is typical of that of most N.L.G.I. committees. Members of these groups, almost without exception, have done better jobs than could rightfully be expected from men who hold responsible positions in their own organizations and who of necessity must carry out their N.L.G.I. assignments in their spare time.

The N.L.G.I. is indeed built on strong foundations. I feel quite safe in predicting that its influence and noteworthy accomplishments will continue to mount in coming years.

a forward step for rapid testing of semi-fluid greases

FIGURE 1.

A Simplified Pressure Viscometer for Semi-Fluid Greases*

by L. C. Brunstrum and Robert Steinbruch
Research Department
Standard Oil Company (Indiana), Whiting, Indiana

INTRODUCTION

Semi-fluid greases may be said to bridge the gap between solid and fluid lubricants. For both of the latter classes, there are well-established methods of evaluating flow characteristics. However, for the routine testing of greases softer than No. 1 grade, there exists no generally accepted instrument that can be considered equivalent in speed and simplicity of operation to the cone penetrometer as applied to heavier greases or to the viscometer for truly fluid lubricants.

A practical pressure viscometer for testing a wide variety of greases, including semi-fluid products, has been described[1] and a method employing such a device has recently been developed by Sub-group 4 of Section II of ASTM Technical Committee G. Although useful for research purposes, this instrument is not likely to replace the simpler penetrometer, which is highly satisfactory for the routine inspection of all but semi-fluid greases.

Pressure viscometers are well suited to the testing of semi-fluid greases. The advantages of such grease-testing instruments that measure apparent viscosity in absolute units, rather than in arbitrary units, have been cited by Arveson[2] and by Beerbower *et al*[3]. Suffice it to say here, the results may readily be related to other types of viscosity measurement and are useful beyond the limited application of checking the uniformity of a given product. These advantages, plus the fact that there exists no single generally accepted instrument for testing semi-fluid greases, provide adequate reasons for employing the pressure viscometer for the routine inspection of these borderline products. Added incentive is provided by the development of simplified instruments, which permit greater speed and ease of operation. Such devices have been studied over a period of years, and a recent development has resulted in the more compact and rugged instrument herein described for the routine testing of semi-fluid greases.

A NEW SIMPLIFIED PRESSURE VISCOMETER

The new simplified pressure viscometer developed in our laboratories is shown in Figure 1. The operating principle is simple and consists of measuring the pressure required to pump the sample at constant flow rate through a capillary of accurately known dimensions.

The equipment is very compact, having dimensions of about one foot on each side. Except for three specially fabricated small parts, the assembly consists of commercially available items. Constructional details and a parts list are given as an Appendix. No provision is made for temperature control, as the viscometer is intended for use in a constant-temperature room or cabinet.

The capillaries are those prescribed in the previously

*Equipment is available under Catalog Number 74934, Precision Scientific Company.

mentioned ASTM method, and are commercially available in a set of eight, all with a length to diameter ratio of 40 to 1. The capillary most generally employed for semi-fluid greases is the No. 1 of this set.

In the operation of the viscometer, the sample—at the test temperature—is poured into the reservoir shown at the right in Figure 1, and is drawn down by the pump and forced through the capillary at the left. After equilibrium conditions are attained, the pressure is read from the sensitive gauge. As the pump is operated at constant speed, the pressure drop across the capillary is a function of the apparent viscosity of the sample, as calculated from Poiseulle's equation:

$$\text{Apparent Viscosity, } N = \frac{\text{Shearing Force}}{\text{Shearing Rate}} = \frac{\frac{PR}{2L}}{\frac{4\ v/t}{\pi R^3}}$$

where P is the pressure in dynes per sq. cm.; R and L are, respectively, the radius and length of the capillary in cm.; and v/t is the flow rate in cc. per sec. For a given capillary and at a constant flow rate,

$$\text{Apparent Viscosity, } N = kP_1$$

where P_1 is the measured pressure and k is a constant that includes all of the fixed factors in the first equation, as well as the conversion factors applicable to the units of pressure measurement.

Since the pump speed is 18 RPM and the pump capacity approximately 0.58 cc. per revolution, shear rates and viscosity constants similar to those shown in Table I are obtained. These figures are only typical, as they take into account the exact size calibration of a given set of capillaries and the certified delivery of the particular pump used in the authors' apparatus.

TABLE I

RANGE OF SHEAR RATE WITH VARIOUS CAPILLARIES

Capillary Number	*Shear Rate, sec.$^{-1}$*	*Viscosity Constant, k (P_1 in PSI)*
40-to-1 Series		
1	31.5	13.60
2	130	3.21
3	261	1.68
4	483	0.913
5	1015	0.419
60-to-1 Series		
1	33.7	7.68

Thus, the apparent viscosity of the sample, in poises, at the shear rate indicated for the capillary being used, is obtained by multiplying the observed pressure, estimated to 1 oz., by the appropriate constant.

DISCUSSION

It will be appreciated that pump output, capillary dimensions and gauge range determine the range of the instrument. Therefore, these features must be adapted to the shear rate at which the greases are to be tested and to the range of greases that will flow into the pump. Because high shear rate tests reflect the oil viscosity rather than the consistency of a grease, it is desirable to select as low a flow rate as is practical. Furthermore, for routine use it is desirable to employ a single capillary. The specified pump speed and model provide a range of about 2 to 400 poises at 30 reciprocal seconds. Thus the range of the instrument extends beyond the semi-fluid range into the N.L.G.I. No. 1 classification of greases, which may be satisfactorily tested with the ASTM penetrometer.

Other capillaries of the set may be employed to advantage as is evident from Table I. To make very soft greases yield higher pressures we have also employed a capillary of about the same radius as the No. 1 40-to-1 size but having a 60-to-1 ratio. When capillaries other than the standard ASTM set are employed, consideration of the resident time should be made, as pointed out by Wilson and Smith[4]. However, we have found that semi-fluid greases change consistency very little, if at all, in one pass through the viscometer. This is illustrated in Table II showing the consistency as measured by other instruments before and after the pressure viscosity determination.

TABLE II

GREASE CONSISTENCY BEFORE AND AFTER TESTING

Grease Grade	*Original Consistency*	*Shear Rate Sec.$^{-1}$*	*Consistency After Test*
N.L.G.I.—F3	169 CI*	31.46	168 CI
00 Cup	232 CI	31.46	232 CI
N.L.G.I.—F3	304 Penetration**	31.46	309 Penetration**

*Consistency index, by Torsion Cone Consistometer[5]
**Unworked; 30-g. cone[6]

Repeatability is excellent, as indicated by the data shown in Table III, which were obtained on a single sample of No. 00 cup grease.

TABLE III

REPEATABILITY OF TESTS

Test	*Temperature, °F.*	*Pressure, psi*	*Apparent Viscosity at 130 sec.$^{-1}$, poises*
1	77.5	6.53	21
2	77.3	6.53	21
3	77.6	6.53	21
4	77.8	6.50	21

In each of these tests, equilibrium pressure was attained within two or three minutes but each test was allowed to run

About the Authors

Robert Steinbruch was born July 31, 1922, Florence, New Jersey. He received a B.S. degree in Chemical Engineering from Pennsylvania State College in 1947. From 1947 to date, he has been employed by the Research Department of Standard Oil Company (Indiana).

During the war, he was a pilot in the Army Air Forces and served twelve months in the Marianna and Philippine Islands.

L. C. Brunstrum, was born in Chicago August 3, 1907. He received his B.S. in Chemical Engineering at Armour Institute of Technology in 1929. Since that time he has been with the Standard Oil Company of Indiana where he began his work on grease in 1930. At present Mr. Brunstrum is a group leader in charge of grease research and development.

five minutes before the pressure reading was taken. This operating time represents a flow of 50 cc. of grease.

The viscometer is readily cleaned with suitable solvents on removal of the sample reservoir and the capillary, but cleaning is not necessary between tests on many semi-fluid products. No appreciable errors have been detected when the first grease is pumped out completely and the following sample is used to flush the instrument.

It is believed that the new simplified pressure viscometer represents a substantial forward step toward the establishment of a standardized method for the rapid routine testing of semi-fluid greases.

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4. Wilson, J. W., and Smith, Gerould H., *Ind. & Eng. Chem.*, Vol. 41, p. 770 (1949).
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APPENDIX

Details of Construction

Constructional features of the instrument are shown in Figure 2, which is numbered in accordance with the parts list that follows. Only the mounting plate, drive adapter, and sample reservoir are specially fabricated.

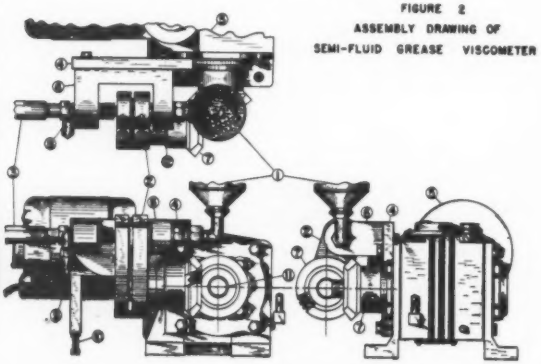
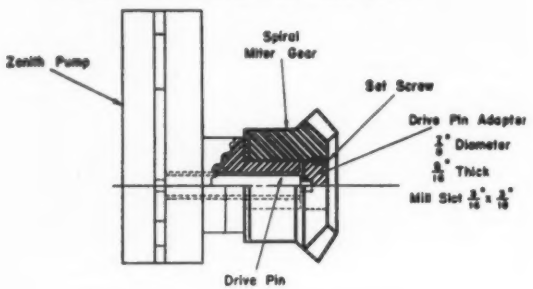


FIGURE 2
ASSEMBLY DRAWING OF
SEMI-FLUID GREASE VISCOMETER

FIGURE 4
DETAIL OF DRIVE PIN ADAPTER



The use of the vertical mounting plate detailed in Figure 3, markedly reduces the size of the instrument.

Design of the sample reservoir is optional; an adequate container can be made from a 12-oz. beer can by removing the bottom and soldering to the neck a half-inch copper elbow, the other leg of which can be fastened to the pump with the fittings supplied with the pump.

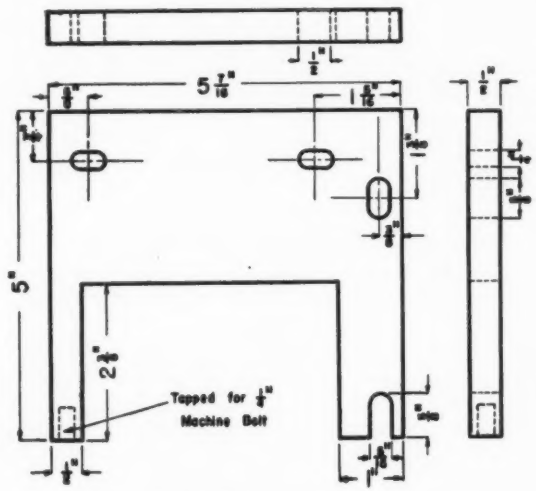
Figure 4 shows the detail for the drive-adapter on the spiral miter gear on the pump. This adapter is press-fitted into the gear and locked in place by a set screw. The gear floats on the pump bearing and is held in position by the pump and mating gear.

The outlet trunnion on the pump, as supplied, requires modification to accommodate the capillary and a connection to the pressure gauge. The necessary machining is indicated in Figure 5.

Figure 2 does not show the location of the pressure gauge, which can be fastened to the vertical mounting plate. Connection to the outlet trunnion is made by means of the shortest possible pipe connections, and a small two-way stopcock is inserted in the line to prevent fluid drainage from the pressure gauge.

Additional small parts needed in the construction of the

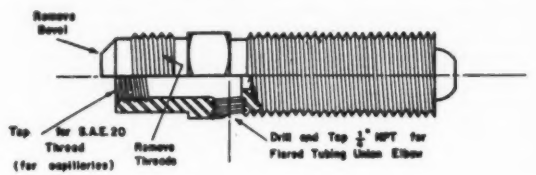
FIGURE 3



MOUNTING PLATE DETAIL

FIGURE 5

OUTLET TRUNNION ON ZENITH PUMP



viscometer are a bushing on the speed-reducer shaft and a ⅛" thrust washer on the pump shaft.

PARTS LIST

Parts numbered in Figure 2

1. Grease Reservoir.
2. Zenith Pump, No. 1B, Type QE.
3. Capillary Set for pressure viscometer, 40-to-1 series (Precision Scientific Company).
4. Mounting Plate (see Figure 3).
5. Bodine Electric Company Speed-Reducer Motor, Type NSY-34 RJ, 115 volts AC, 2.0 amps., 1800 RPM, single phase, 1/20 HP, 60 cycle, 100-to-1 speed reduction, 79 in.-lbs. torque.
6. Saddle Mount for Zenith pump (available with pump).
7. Boston Steel Spiral Miter Gears, Catalog No. LS 104, ⅞" bore.
8. ¼" Flared Tubing Union Elbow.
9. ¼" copper tubing (to connect pressure gauge and outlet trunnion).
10. Leveling screw (¼" machine bolt).
11. Bushing, O.D. ⅞", I. D. ¾".
12. Thrust washer, O. D. 2", I. D. ⅞", Thickness ⅛".

Parts shown only in Figure 1

Ashcroft Laboratory Test Gauge, 0-30 pounds per sq. in., ⅛-lb. subdivisions.

Mounting bracket, for pressure gauge.

Two-way stopcock, for pressure line.

Books and Publications

. . . About the Industry

THE PRACTICE OF LUBRICATION

An Engineering Treatise on the Origin, Nature, and Testing of Lubricants, Their Selection, Application, and Use.

By T. C. Thomsen. Third edition. 638 Pages, 6x9, 232 Illustrations (1937), $6.50.

Deals with the subject especially from the standpoint of the uses and conditions to which lubricants are subjected in particular types of machinery, giving the information needed by engine builders, mechanical and electrical engineers in charge of plant, lubricating engineers, and oil chemists and manufacturers, who are interested in the improvement of lubricants and their application.

INDUSTRIAL CHEMISTRY—Fourth Revised Edition

by E. Raymond Riegel, Professor of Industrial Chemistry, University of Buffalo, with the support of a large number of Collaborators.

861 Pages, 293 Illustrations, $5.50.

Expressly planned for those who wish to familiarize themselves with the changes that new processes and products are bringing about in established businesses. The author has been careful to arrange each chapter in logical sequence with sketches and drawings designed to illustrate modern development in the industry. Tables, production figures and prices, all of recent date, serve to emphasize the economic importance of each group of manufacturers from the standpoint of yearly business. A special point has been to make the list of reading references as rich as the literature allowed, with emphasis on recent publications.

We have no hesitation in characterizing this book as the most complete, informative, accurate and readable survey of the whole field of chemical industry that has ever been offered to the English-speaking public.

PROCEEDINGS OF THE 1946 CONFERENCE

These Proceedings also provide first hand information on mechanical problems involved in the production, transportation, refining, and use of petroleum and its products. There are 35 articles in the collection with seven dealing with applications, seven covering construction materials, six discussing production, twelve considering refining and equipment, three devoted to transportation. Published 1947—$4.50.

FATTY ACIDS

Their Chemistry and Physical Properties.

by Klare S. Markley, Principal Chemist—Oil, Fat and Protein Division, Southern Regional Research Laboratory, U. S. Dept. of Agriculture, New Orleans, La. 1947, 678 Pages, 81 Illustrations, 6x9, $10.00.

(*Fats and Oils*)

CONTENTS: A. Nature and History of Fats and Waxes. B. Classification and Structure of the Fatty Acids. C. Physical Properties: Crystal, Spectral, and Thermal Properties. Solubility and Solution Properties. Properties in the Liquid State. D. Chemical Reactions: Salts of Fatty Acids. Esterification and Interesterification. Alkylation and Alkoxylation. Pyrolysis. Halogenation. Hydrogenation and Hydrogenolysis. Oxidation and Hydroxylation. Oxidation by Atmospheric Oxygen (Autoxidation). Biological Oxidation. Nitrogen Derivatives of Aliphatic Acids. Sulfur Derivatives of the Fatty Acids. E. Synthesis: In Vitro Synthesis of Fatty Acids. F. Isolation and Identification: Separation. Identification of Individual Fatty Acids. Author and Subject Indexes.

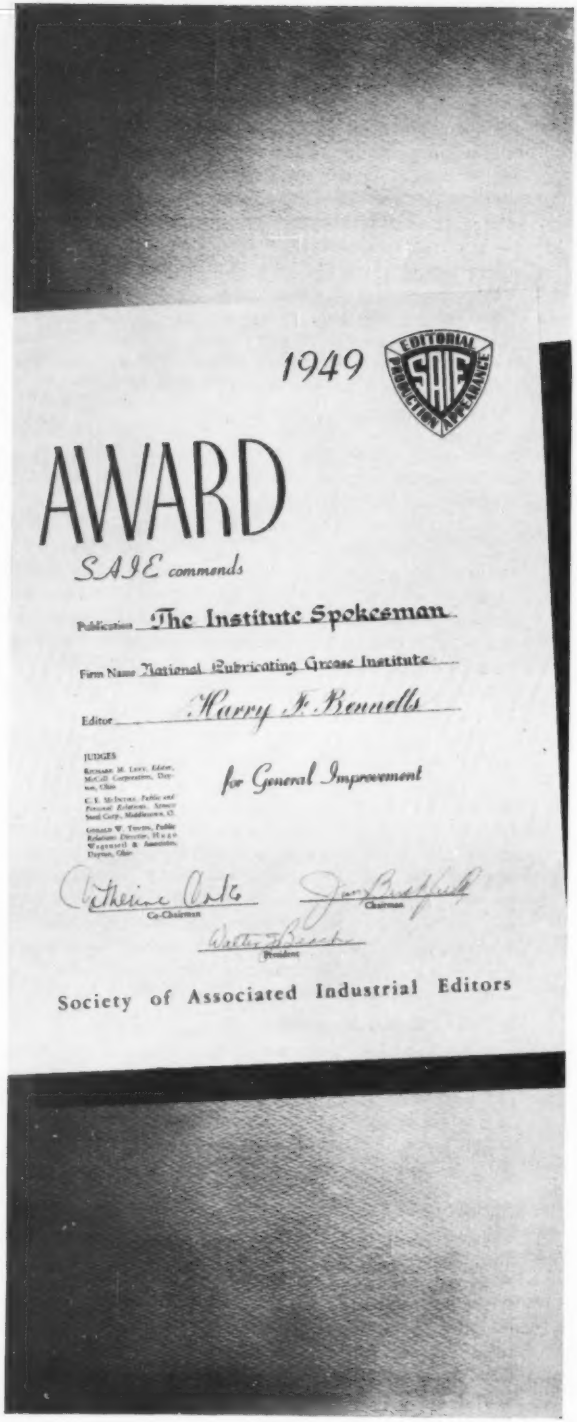
"There has been a definite need for such a book in this rapidly expanding field. The need is very adequately filled by this book and investigators in the field will be grateful to Dr. Markley for the painstaking labor involved in its preparation. It brings together in logical and easily readable form information which is widely scattered throughout the literature for the past 150 years. The many tabulations and graphical representations of the physical and chemical properties of the fatty acids and their derivatives alone make the volume valuable. Many references are cited. Laboratory and commercial methods of separation and preparation are covered."—H. C. Black in *Chemical and Engineering News.*

N.L.G.I. Greasonalities

The Chek-Chart Corporation entertained at a Cocktail Party and Buffet Supper, Hotel Statler Detroit, Mich., October 20, as a salute to the twentieth anniversary of the automotive industry.

The Louisville Sales Division of the Gulf Refining Company has been transferred to the Toledo Office.

Mr. and Mrs. H. A. Mayor, Sr., on a vacation trip to Alaska, stopped at Minneapolis, where they met, and were entertained by Mr. and Mrs. L. L. Gray, Mr. and Mrs. R. J. Gray, Mr. and Mrs. Harry Murphy, and Mr. and Mrs. Greer Wheaton, of Gray Company, Inc. In Winnipeg, Mrs. Nina Gray and Mr. R. J. Christian, Manager, Angelo-Canadian Oil Co., Ltd., joined them and they traveled on to Vancouver where Mr. and Mrs. Joe Johnson, President of the Johnson Oil Company, Mr. and Mrs. I. D. Horton, President of the Horton Service, Inc., formed a party that took a 10-day boat excursion to Skagway, Alaska.



1949

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Publication The Institute Spokesman

Firm Name National Lubricating Grease Institute

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INSTITUTE SPOKESMAN WINS NATIONAL RECOGNITION

Everyone has been watching the "SPOKESMAN" expand in both size and quality with the ultimate goal somewhat obscure. On September 23rd, that goal was distinctly revealed when the Society of Associated Industrial Editors presented our publication with a General Improvement Award during their Annual Convention.

Competing in a field of over 400 publications entered in the contest from both the United States and Canada, our publication offers this hard won Award with quite some considerable feeling of pride. Everyone believed this an outstanding publication—now we know it has achieved the ultimate.

Credit Them With This Success

For many years our publication has been filled almost entirely with reprints of papers delivered at the Annual Meetings. With expansion in size came the necessity of obtaining not only more technical material; but fresh articles written directly for the "SPOKESMAN" and its readers.

Meeting this new problem, President B. G. Symon appointed Mr. Harold Fraser Chairman of an Editorial Committee to procure new technical articles. Entering into an entirely new and untried endeavor, Mr. Fraser emerged with a series of completely different type of articles designed for "SPOKESMAN" readers. Some have already appeared, more are scheduled for future publication.

If you feel a twinge of justifiable pride in this national honor, check much of it to Harold M. Fraser and his exceptional contribution to our success.

Other consistent contributors to our national recognition is a secret Editorial Committee appointed by President Symon to pass upon all articles for their authenticity and technical veracity. They will remain as "unsung heroes".

The minutes of the New Orleans meeting will probably be ready for distribution in November. In the meantime here are some of the highlights.

1. The attendance records showed 115 present at the morning session, and it is estimated that about 100 returned for the afternoon part of the agenda.
2. The reviews of the activities of other technical organizations, particularly ASTM Technical Committee G, working on laboratory test methods for lubricating greases presented convincing evidence that important progress is being made in that field. However, it was the consensus of the meeting that more work should be done on methods for determination of oil separation characteristics of greases.
3. During the discussion of the results obtained to-date by the Panel on Delivery Characteristics of Dispensing Equipment for Lubricating Greases, it became apparent that a key requirement for their project is a procedure for measuring the comparative rates at which greases will prime or maintain feed to the pumping mechanisms of the guns. The Panel will welcome information on any laboratory methods which may have merit for measuring that factor. They will also appreciate receiving ideas regarding the minimum rates of discharge from the gun that would be acceptable to the trade under normal operating conditions.
4. The need for follower plates and the complications introduced by the present lack of uniformity of container dimensions were discussed. It was suggested that the latter is a problem which would be more properly handled by the American Standards Association rather than NLGI.
5. The ABEC-NLGI Cooperative Committee on Grease Test Methods continues to receive full support.
6. It was proposed by the Subcommittee on NLGI Classification of Greases that a survey be conducted to obtain detailed comments regarding the following, and other, suggestions for changing the present system.
   A—Include grades covering block and semi-fluid greases.
   B—Widen grade limits from thirty to fifty points and eliminate gaps between those grades.
   It was stated that in view of the wide acceptance of the NLGI Classification no change would be adopted until it had received thorough substantiation.
7. The Subcommittees responsible for assisting in obtaining and editing papers for the Institute Spokesman reported progress which was remarkable in view of the short time they have been organized.
8. Due to lack of time, neither the proposal to establish a research fellowship nor the idea of undertaking studies of fundamental engineering principles was sufficiently explored at the meeting to enable crystallization of the position of the meeting in respect to acceptance or rejection. It was agreed, therefore, that the Chairman should review all of the opinions expressed during the meeting and then again present the subjects to the membership, through correspondence, before the next annual meeting.
9. Papers were read on the subject of "Changes of Unworked and Worked Penetrations of Storage Greases", which included data demonstrating the importance of this problem.

Summarizing, it may be stated that the meeting was successful in that it stimulated a healthy exchange of opinions and information by a wide representation of the committee members on problems which they regard as important to the industry and the solution of which will enable the industry to give better service to the consumers of lubricating greases.

N.L.G.I. Selects Seasoned Leadership For Another Outstanding Year

Mr. Howard Cooper, was unanimously selected as the Vice-President at the annual meeting. In past years he has served this organization with distinction on various committees, particularly as Chairman of the Membership Committee during 1947 and 1948 when more members were brought into the Institute than during any previous period. Following our usual custom, Mr. Cooper will serve as Chairman of the Program Committee for the 18th Annual Meeting which will be held at the Edgewater Beach Hotel October 30, 31 and November 1, 1950. With an unbroken record of continued success in N.L.G.I. leadership; members can look forward to another record-breaking meeting in 1950.

New Board Members

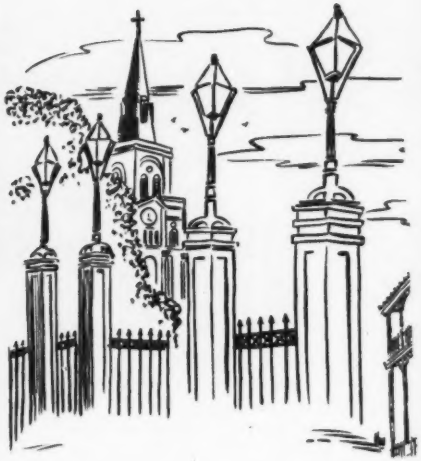
Mr. W. H. Saunders, Jr., Chairman of the Nominating Committee, announced the selection by his committee for six Board of Directors to serve the Institute for the next three years. His committee selected:

H. L. Hemmingway, J. R. Corbett, H. P. Hobart, H. A. Mayer, L. W. McLennan and R. Cubicciotti as their selections. Four of the men selected have previously served on the board; both Mr. McLennan and Mr. Cubicciotti being the two freshmen members.

E. V. Moncrieff Elected as Treasurer

After serving a number of years as Treasurer, Mr. E. V. Moncrieff was again unanimously re-elected to that post. A highly important position to fill, it was the feeling of everyone present that he should again carry on the work that has brought the N.L.G.I. financial position to its present status.

All the new officers will assume office January 1, 1950, and serve until December 31, of the same year.

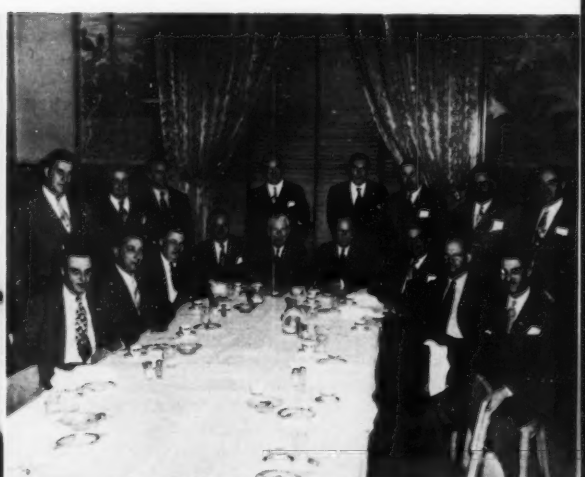


The N.L.G.I. 17th Annual Meeting was held in New Orleans, Louisiana, October 3 to 5, with headquarters at the Roosevelt Hotel. The meeting was characterized by record-breaking meeting attendance and enthusiasm for the completely balanced program presented.

Start reading pictorial review in upper left hand corner and go down.

Incoming guests were met at the registration desk in the lobby of the Roosevelt Hotel by the charming smiles of the girls who registered each and every guest. President B. G. Symon welcomed guests to the 17th Annual Meeting and the program was under way. Mr. T. G. Roehner, Socony-Vacuum Oil Company, Inc., delivered his speech, "Twister Ring Greases" to an attentive audience. Mr. Roehner, is the Technical Committee Chairman of the N.L.G.I. A record breaking audience listened to the outstanding speakers who delivered papers pertinent to the lubricating grease industry.

Seated on the first row is Vice-President A. J. Daniel who served as program chairman. Next to Mr. Daniel is C. W.

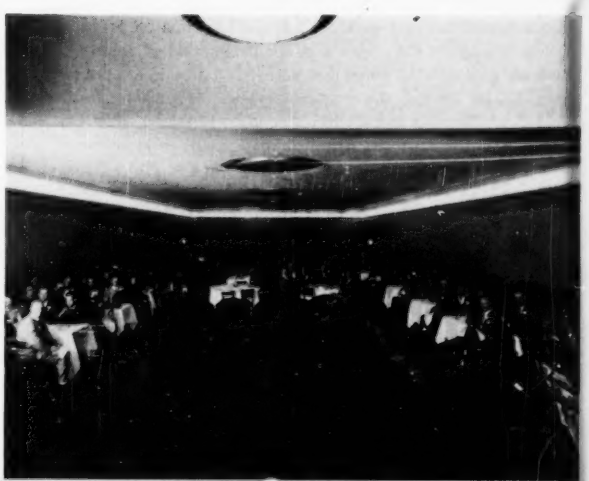


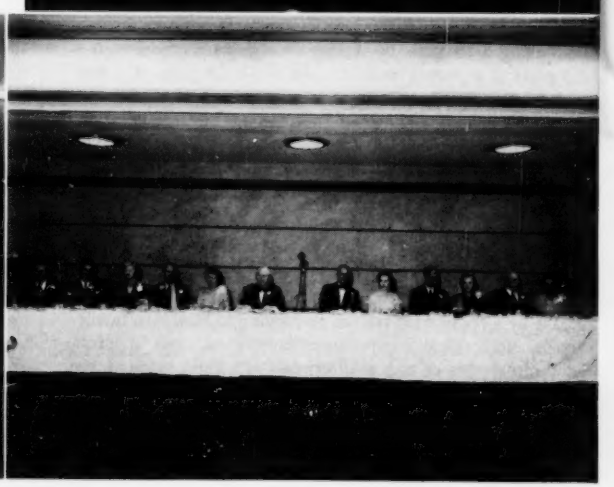
PICTORIAL REVIEW SHOWS N.L.G.I. 17th ANNUAL MEETING HELD IN NEW ORLEANS

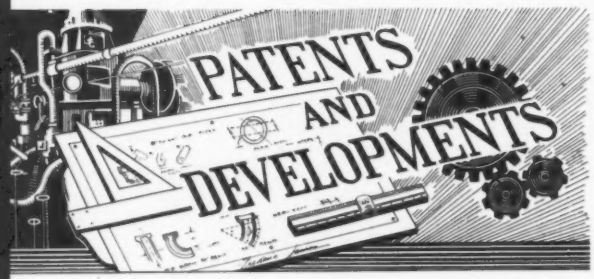
Kelley a speaker on "Grease for Military Ground Equipment".

The Board of Directors held a Board Luncheon in the Pan American Room, seated left to right around the table, are: Howard Cooper, R. Cubicciotti, W. H. Oldacre, Executive Secretary H. F. Bennetts, President B. G. Symon, Vice-President A. J. Daniel, J. R. Corbett, W. H. Saunders, W. W. Albright; standing, left to right, C. B. Karnes, F. C. Kerns, L. W. McLennan, H. P. Hobart, Paul V. Keyser, Jr., M. R. Bower, H. A. Mayor, G. E. Merkle.

Presiding at the official banquet table are, left to right: F. C. Kerns, C. B. Karnes, Mrs. F. C. Kerns, Mr. H. A. Mayor, Mrs. A. J. Daniel, President B. G. Symon, Vice-President A. J. Daniel, Mrs. B. G. Symon, Mr. W. H. Saunders, Jr., Mrs. J. R. Corbett, Mr. J. R. Corbett, and Mrs. W. H. Saunders, Jr. The big night of the Annual Meeting was the banquet held in the Ballroom of the Hotel Roosevelt. Guests were entertained with a floor show which was presented in night club style.







BRAKE CAM AND ANCHOR GREASE—Veedol brake cam and anchor grease has been developed by Tide Water Associated Oil Co. specifically to overcome difficulties which arise in brake systems of passenger cars, trucks, buses, etc., through sticking or seizing of brake cams and anchor pins. It is said to prevent rust on operating parts (*Oil and Gas J.* 9-8-49, p. 117).

ALUMINUM STEARATE GREASE—One recent grease development covered in U.S. 2,480,647, issued to Standard Oil Development Co., deals with the production of aluminum stearate greases. It is noted that when such greases are poured into 400-lb. drums, the portion next to the outside of the drums which cools quickly has a good consistency, while that in the center tends to be semi-fluid and grainy in appearance.

When aluminum stearate is mixed in mineral oil in grease-forming proportions and the mixture is heated to a temperature of 275°-350° F., a rubbery plastic mass is formed. When the resulting grease is cooled, the rubbery mass changes to a gel or regular grease structure at around 100°-130° F., this being known as the tansition temperature, which varies somewhat, depending on the proportions of constituents used. Further cooling beyond the transition range with agitation tends to break down the gel to a stringy semi-liquid product having grainy characteristics. However, if agitation is stopped just a few degrees below the transition temperature a firm gel of desirable grease consistency and texture is obtained.

The patent specifies the use of solid carbon dioxide as a refrigerant to lower the grease temperature rapidly below the transition temperature. The recommended procedure involves combining 5-15 parts by weight of aluminum stearate, 0.5-2.5 parts of a phenol modifier, and 94.5-82.8 parts of a mineral lubricating oil, heating the composition to 275°-350° F. to form a grease, cooling the grease rapidly by means of external water, accompanied by mechanical working, to a temperature approaching the transition temperature, and thereafter mixing 0.5-3 parts of solid carbon dioxide to the grease to reduce its temperature rapidly towards the end of the cooling operation.

CONTINUOUS GREASE PRODUCTION—Hain of the U. S. Navy describes a method for producing a high quality grease by a continuous system. According to him, high quality greases are critical compositions containing loosely flocculated dispersions of tiny soap crystals in a fluid medium, the size and state of aggregation of the crystals having a pronounced effect on the physical properties of the finished grease. A microcrystalline soap structure of large intercrystalline surface area is necessary in such a grease to hold the fluid phase in equilibrium and prevent its bleeding out of the mass.

The transition from hot fluid to stable gel must be accomplished as soon as possible, since slow cooling promotes crystal growth and therefore less interfacial area to hold the fluid. Therefore, the temperature should not be any higher than that needed to complete solution of the soap in the base fluid, and the cooling should proceed to equilibrium conditions at such a rate as to avoid formation of coarse soap granules.

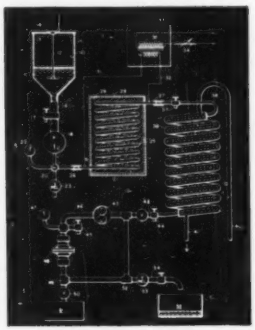
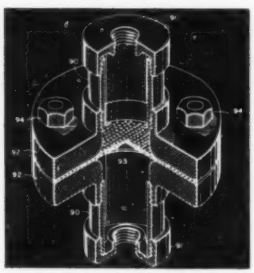


Figure 1 shows a flowsheet of one system described, employing this technique. The fluid grease formulation or working slurry, is mixed in agitator 10 and pumped by pump 18 at 500-1500 psi through thin heating tube 25 surrounded by insulation 29 in heater 28. This tube is insulated at ends 26 and 27 and is heated by passing a current through the tube through leads 31 and 32 from the secondary of transformer 33. This tube is preferably of stainless steel and has an inside diameter of the order of about twice the thickness of a free-flowing film of the fluid grease base, and a wall thickness of only a few millimeters, just enough to hold the pressure.



After the composition is rapidly heated in tube 25 it is cooled rapidly in tube 38 which is surrounded by cooling coil 39 carrying cold water. A variable speed gear pump 43 is connected to the discharge of cooling coil 38, and the cooled grease is pumped into working section 48, the details of which are shown in Figure 2. A vacuumizing system 51 is provided at the discharge end of the working section, and the worked grease is recycled back to pump 43 and working section 48, while a stream of finished grease is drawn off into tank 55. From Figure 2, it will be seen that the working section consists of a perforated plate 93 which tends to break down the grease structure as the grease passes through the numerous orifices.

The examples are directed mainly to lithium base greases. (U.S. 2,478,917).

DEHYDRATED LIME SOAP LUBRICANT—A Canadian patent (458,122) issued to Texaco Development Corp. describes a method of making a completely dehydrated lime soap lubricant, free from glycerine, by heating and mixing together saturated higher fatty acids free from glycerides and mineral lubricating oil, adding a slurry of lime to neutralize the acids and form the lime soap. Heating is continued together with mixing, to drive off the water and form a substantially completely dehydrated lime soap base with the mineral oil present. Then, there is added to the dehydrated

product at its elevated temperature, a small proportion of neutral lanolin together with a small proportion of a higher boiling fatty acid ester of a polyhydric alcohol other than a triglyceride, while continuing the mixing, then adding additional mineral oil while the temperature is permitted to drop slowly. The mixing is continued until the required amount of oil is introduced to give the soap content desired. Finally, the lubricant is drawn in an anhydrous condition when the temperature has dropped to below 200° F.

A claim specifies 10-30% of calcium fatty acid soap and about 0.5-3% of added neutral lanolin as stabilizer.

CUP GREASE—A cup grease of improved heat and texture stability is also described in a Texaco Development Co. patent. It covers an anhydrous lime soap lubricant, free of glycerine, and containing mineral lubricating oil, calcium fatty acid soap, and a stabilizing mixture comprising about 0.4-0.8% free higher fatty acid, lanolin, and an ester of a higher fatty acid and a polyhydric alcohol, the ester being of a group consisting of partial esters and esters containing ether linkages. A preferred example for such ester is glyceryl monostearate, while the preferred calcium soap is the calcium soap of a mixture of saturated fatty acids from hydrogenated fatty oil (Can. 458-123).

SURVEY ON ADDITIVES—Kalichevsky is publishing comprehensive patent surveys on lubricant additives. One such tabulation on oxidation inhibitors (and detergents) was recently published (*Petr. Refiner* 9-49, p. 85).

LUBRICATION OF IRON AND STEEL SMELTING AND REFINING MACHINERY—A discussion under this heading (including greasing) is given in the September 1949 issue of *Lubrication.*

ELECTRO-MECHANICAL TESTER FOR EVALUATING BALL BEARING GREASES—Axelrad and others describe such a unit (*Prod. Engrg.* 9-49, p. 132).

PATENT LITIGATION—The Johnson *et al* patent 2,040,177 dealing with hydraulic lubricating connections had claims declared invalid by a Circuit Court of Appeals—Alemite Co. vs. Jiffy Lubricating Co. (82 USPQ 349).

TEXTILE LUBRICANT—Texas Co. is marketing Summitlube O, a soft consistency, white lubricant for light duty lubrication in textile mill twister rings (*Chem. Proc. Prev.* 8-49, p. 20).

FOREIGN PATENTS AND APPLICATIONS

Brit. Appl. 16087/49 (Standard Oil Dev. Co.)—Lubricating grease.

Brit. Appl. 17914/49 (Standard Oil Dev. Co.)—Alkaline earth metal soap greases.

Brit. Appl. 21085/49 (Standard Oil Dev. Co.)—Lubricating greases.

Can. 459,331 (Tecalemit, Ltd.)—Grease gun or compressor.

Foote Mineral Company Announces Five New Men to Research Staff

Dr. S. C. Ogburn, Jr., Manager, Research and Development and Director of Foote Mineral Company, announces the addition of five new men to his growing organization.

Mr. Harry B. Hunter, B.S. in Metallurgical Engineering from Carnegie Institute of Technology in 1943, served in the U. S. Navy following graduation. He entered graduate school of University of Pennsylvania and served as assistant instructor in metallurgy. Having received his master's degree, he joins Foote Research and Development laboratory as a metallurgist.

Mr. J. M. Kishel attended Bucknell University and received his B.S. in Chemistry from Indiana University in 1942. He was previously employed by American Viscose Corp., Lewistown, Pa., as control chemist. He joins Foote Research and Development laboratories as a chemist in the analytical section.

Mr. Edward Loveland, B.S. in Ceramic Engineering from Rutgers University last June, joins Foote Research and Development laboratories as ceramic research assistant. He served three years in U. S. Navy and while attending Rutgers was active in the crew and intermural sports.

Dr. Everett R. Johnson, B.A. University of Iowa, M.A. Harvard University, Ph.D. University of Rochester, specializing in chemical kinetics, joins Foote as research chemist. After his M.A. degree from Harvard, he was employed by the Texas Company for two and one half years.

Mr. David Coghlan, B.E. from Yale in 1941, joins the Foote Research and Development laboratory as a chemical engineer to conduct pilot plant studies. He was previously employed by the General Chemical Company plants at Cleveland, Point Pleasant and North Claymont, and with the duPont Company as development engineer.

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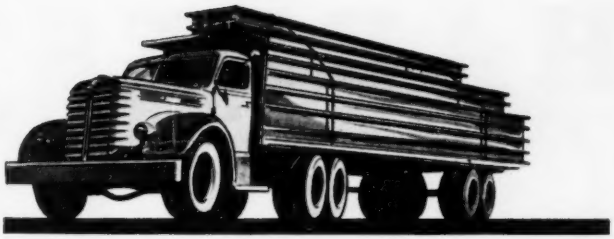

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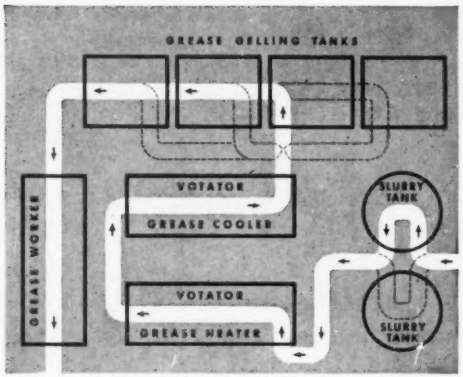

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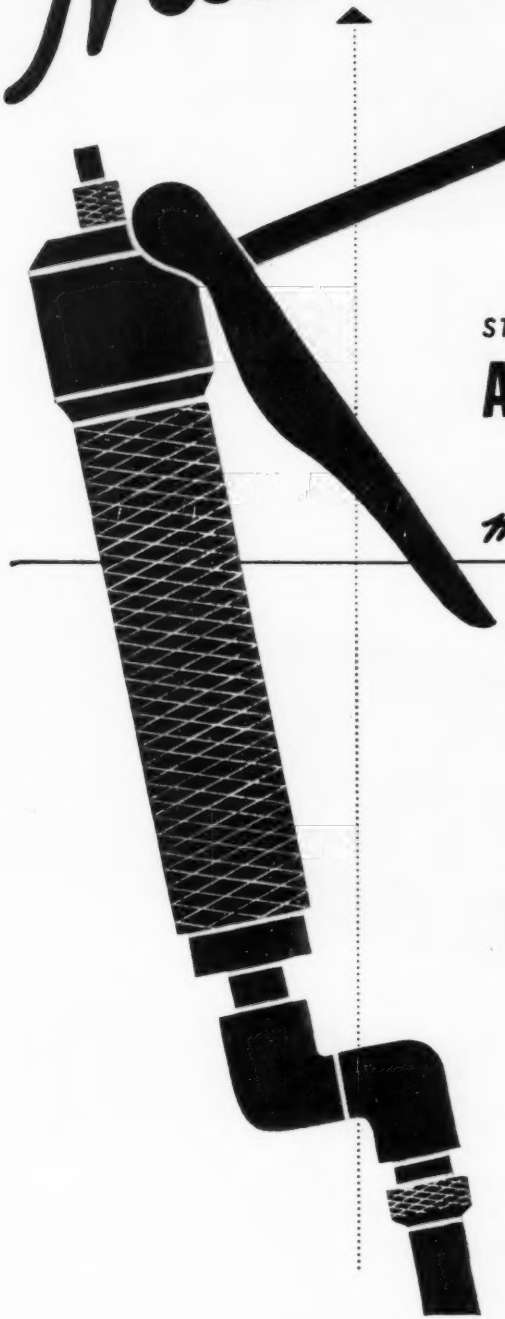

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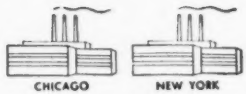

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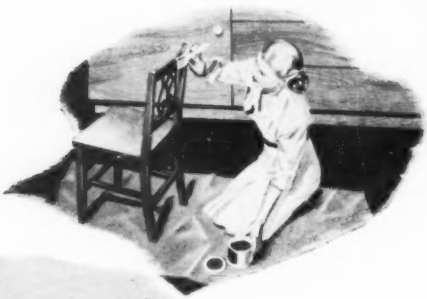
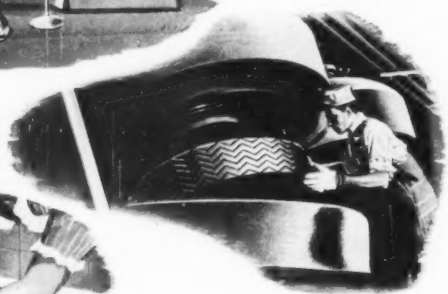


brightening the corner – Witco Aluminum Stearates impart a soft, silky surface to flat paints and also help keep the pigments in suspension.

music to your ears – The fabrication of plastics, which includes the making of records, is aided by the use of Witco Stearates as internal lubricants, as heat stabilizers for vinyl resins, and as mold dusting powders.



snaps out of it – Witco Metallic Stearates make it possible to release a rubber product from its mold easily. Witco Stearates are also widely used in the rubber industry as dusting powders.

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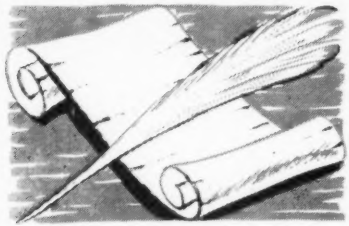

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